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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,605	06/27/2003	Kong Weng Lee	70030259-1	2253
57299	7590	04/06/2006	EXAMINER	
AVAGO TECHNOLOGIES, LTD. P.O. BOX 1920 DENVER, CO 80201-1920			OWENS, DOUGLAS W	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/608,605	Applicant(s) LEE ET AL.	
	Examiner Douglas W. Owens	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,5 and 11-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,11-21,23 and 25-27 is/are rejected.
- 7) ☒ Claim(s) 22,24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: in line 16 of the claim "susbtrate" should be replaced with --substrate--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent No. 5,640,048 to Selna.

Regarding claim 1, Selna teaches a packaging device for a semiconductor die (Fig. 1), the packaging device comprising:

- a substantially planar substrate (4) with opposed major surfaces;
- an electrically conductive die mounting pad (8C) located on one of the major surfaces of the substrate, the conductive die mounting pad dimensioned to accommodate the die (12) with a major surface of the die in contact therewith;
- a first electrically conductive connecting pad (10C) on the other of the major surfaces of the substrate, the first electrically conductive connecting pad dimensioned to conform to an industry standard pad layout of a printed circuit board;

Art Unit: 2811

a first electrically conductive interconnecting element (6C) extending through the substrate and electrically interconnecting the mounting pad and the first electrically conductive connecting pad;

an electrically conductive bonding pad (8A) located on the one of the major surfaces of the substrate;

a second electrically conductive pad (10A) located on the other of the major surfaces of the substrate; and

a second electrically conductive interconnecting element (6A) extending through the substrate and electrically interconnecting the bonding pad and the second electrically conducting connecting pad.

Regarding claim 2, Selna teaches a packaging device, wherein the substrate comprises an epoxy laminate (Col 2, lines 38 – 42).

Regarding claim 4, Selna teaches a packaging device, wherein the mounting pad and the first electrically conductive connecting pad comprise copper (Col. 1, lines 37 – 42).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 5 and 11 – 21, 23, 25 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Selna.

Regarding claim 5, Selna does not teach using tungsten for the first conductive interconnecting element. Tungsten is a known material that is well suited for use in interconnecting elements. It would have been obvious to one having ordinary skill in the art to select tungsten, since it is a known metal that is well suited for the intended use.

Regarding claims 11 and 21, Selna teaches a semiconductor device, comprising:
semiconductor die including pinouts (Col. 1, lines 17 – 20) on a portion of a bottom surface of the die;

a substantially planar substrate (4) having opposed major surfaces;
a conductive die mounting pad (8C) located on one of the major surfaces,
wherein the conductive die mounting pad is dimensioned to accommodate the semiconductor die;

a conductive connecting pad (10C) located on the other of the major surfaces;
a conductive interconnecting element (6C) extending through the substrate and electrically interconnecting the mounting pad and the connecting pad; and
wherein the semiconductor die is mounted on the die mounting pad and an electrical connection is formed between the die pads and the mounting pad.

Selna does not teach that the pinouts on the die comprise a metal. Selna is silent with respect to the pinout material. It would have been obvious to one of ordinary skill in the art to select metal for the pinout material (metallization on a bottom portion), since metal is a known material that is well suited for the intended use. The selection of a known material based on its suitability for its intended use supported a *prima facie*

Art Unit: 2811

obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claims 13 and 18, Selna teaches a packaging device, wherein the substrate comprises an epoxy laminate (Col 2, lines 38 – 42).

Regarding claim 14, Selna teaches a packaging device, wherein the mounting pad and the first electrically conductive connecting pad comprise copper (Col. 1, lines 37 – 42).

Regarding claims 15, 20 and 26, Selna does not teach using tungsten for the conductive interconnecting element. Tungsten is a known material that is well suited for use in interconnecting elements. It would have been obvious to one having ordinary skill in the art to select tungsten, since it is a known metal that is well suited for the intended use.

Regarding claims 16 and 23, Selna teaches a semiconductor device, further comprising:

- a conductive bonding pad (8A) smaller in area than the die mounting pad, the bonding pad located on the one of the major surfaces;

- an additional conductive connecting pad (10A) located on the other of the major surfaces;

- an additional conductive interconnecting element (6A) extending through the substrate and electrically interconnecting the bonding pad and the additional connecting pad;

Art Unit: 2811

the semiconductor die additionally comprising pads on the die (Col. 2, lines 3 – 6); and

a bonding wire (22) extending between the die pad and the bonding pad.

Selna does not teach that the die pads on the die comprise a metal. Selna is silent with respect to the die pad material. It would have been obvious to one of ordinary skill in the art to select metal for the die pad material (metallization on a bottom portion), since metal is a known material that is well suited for the intended use. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claim 17, Selna teaches a semiconductor device, further comprising an encapsulant (16) encapsulating the semiconductor die and a portion of the major surface of the substrate on which the mounting pad is located.

Regarding claim 19, Selna teaches a semiconductor device, wherein the mounting pad, the bonding pad and the connecting pads each comprise copper.

Regarding claim 25, Selna teaches a semiconductor device, wherein the first electrically conductive interconnecting element is selected to withstand an operating temperature when the semiconductor die is mounted on the electrically conductive mounting pad and to provide a low-resistance electrical connection between the mounting pad and the first electrically conductive connecting pad.

Regarding claim 27, Selna teaches a semiconductor device, wherein the first electrically conductive interconnecting element comprises a slug of electrically

Art Unit: 2811

conductive material, the slug having a diameter selected to fit into a through hole in the substrate between the mounting pad and the first electrically conductive connecting pad. Selna does not teach that the slug is selected to press-fit into the through hole.

This is considered a product-by-process limitation. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Selna as applied to claim 11 above, and further in view of US Patent No. 6,268,654 to Glenn et al.

Selna does not teach a semiconductor device, wherein the substrate comprises ceramic. Glenn et al. teaches a semiconductor device, wherein the substrate comprises ceramic (Col. 5, lines 19 – 27). It would have been obvious to one of ordinary skill in the art to incorporate the teaching of Glenn et al. into the device taught by Selna, since it is desirable to use materials that are known and well suited for the intended use.

Allowable Subject Matter

7. Claims 22 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments with respect to claims 1, 2, 4, 5 and 11 – 21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

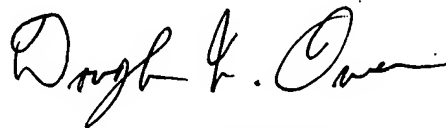
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W. Owens whose telephone number is 571-272-1662. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2811

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Douglas W. Owens". The signature is fluid and cursive, with the first name "Douglas" being more prominent and the last name "Owens" following in a similar style.

Douglas W Owens
Examiner
Art Unit 2811